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Indian Standard

RECOMMENDATIONS FOR GHEE REFINERY

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RECOMMENDATIONS FOR GHEE REFINERY

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Indian Standard
RECOMMENDATIONS FOR GHEE REFINERY

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 23 December 1966, after the draft finalized by the Dairy Products and Laboratory Apparatus Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 A ghee refinery is an establishment where raw (*KACHCHA*) ghee or butter or cream received from the producers is subjected to the physical processes of heating and clarification and the final product is filled into containers and sealed for despatch to the consuming markets. The ghee shall not be subjected to any chemical refinement to improve its appearance, colour, flavour or taste. At present, addition of antioxidants to ghee is prohibited by law.

0.3 Refining practices differ in different parts of the country but the basic principles and practices involved are the same. In some parts of the Southern States, butter is generally the starting material for processing whereas in the Northern parts of the country, it is *KACHCHA* ghee which contains considerable amount of butter-milk (*CHHACH*) and suspended matter, such as casein. The heating of butter of *KACHCHA* ghee is done in iron pans (*KARAHIS*). Generally, butter is heated to a temperature of 110° to 115°C (sometimes even up to 130°C) so that the ghee may have a strong flavour preferred by the consumers in the South. On the other hand, *KACHCHA* ghee is heated only to about 70° to 80°C and the resultant product has a rather mild flavour which is liked by the consumers in the North. The supernatant ghee from the *KARAHIS* is transferred to a settling tank made of thick galvanized iron sheet and provided with tapering or sloping bottoms. The ghee is allowed to remain in the settling tank for 4 to 12 hours depending upon the season. The clarified ghee is filled into tins from a tap fixed at a suitable height from the bottom of the settling tank.

0.4 The fuel used for heating is wood, charcoal gas or oil. Steam jacketed heating pans have not been in use, except in some modern dairies.

0.5 The layout for a ghee refinery should be such as to meet the basic requirements of efficiency, sanitation and aesthetic appeal while keeping, at the same time, the cost of establishment to the minimum.

0.6 In formulating this standard, considerable assistance has been derived from the following:

The Fruit Products Order, 1955

The Ghee Grading and Marking Rules, 1938, and the instructions issued thereunder from time to time by the Agricultural Marketing Adviser to the Government of India

Prevention of Food Adulteration Act, 1954, and Prevention of Food Adulteration Rules, 1955

0.6.1 Due consideration has also been given to the recommendation given in IS:2491-1963*.

0.6.2 This standard also gives details of equipment required for a ghee refinery. The Committee, therefore, decided to seek the guidance of Dairy Equipment Sectional Committee, AFDC 35 in finalization of this standard. Hence the standard was finalized in joint meeting of AFDC 34 and AFDC 35. Co-operation received from the Chairman and members of AFDC 35 is duly acknowledged.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS:2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard recommends the general layout plan, constructional details and other requirements and equipment for a ghee refinery handling 10 to 60 quintals of ghee per melt.

NOTE — Melt is the total quantity of ghee in the settling tank offered as a homogenous lot for purposes of sampling and grading.

2. LAYOUT PLAN

2.1 A typical layout plan of the refinery is given in Fig. 1. Variations in the plan may be made depending upon the amount of ghee being handled per melt and individual requirements of the particular refinery.

3. SANITARY CONDITIONS

3.1 The refinery shall conform to IS:2491-1963* to the extent the code is applicable to a ghee processing refinery. While applying the code to a

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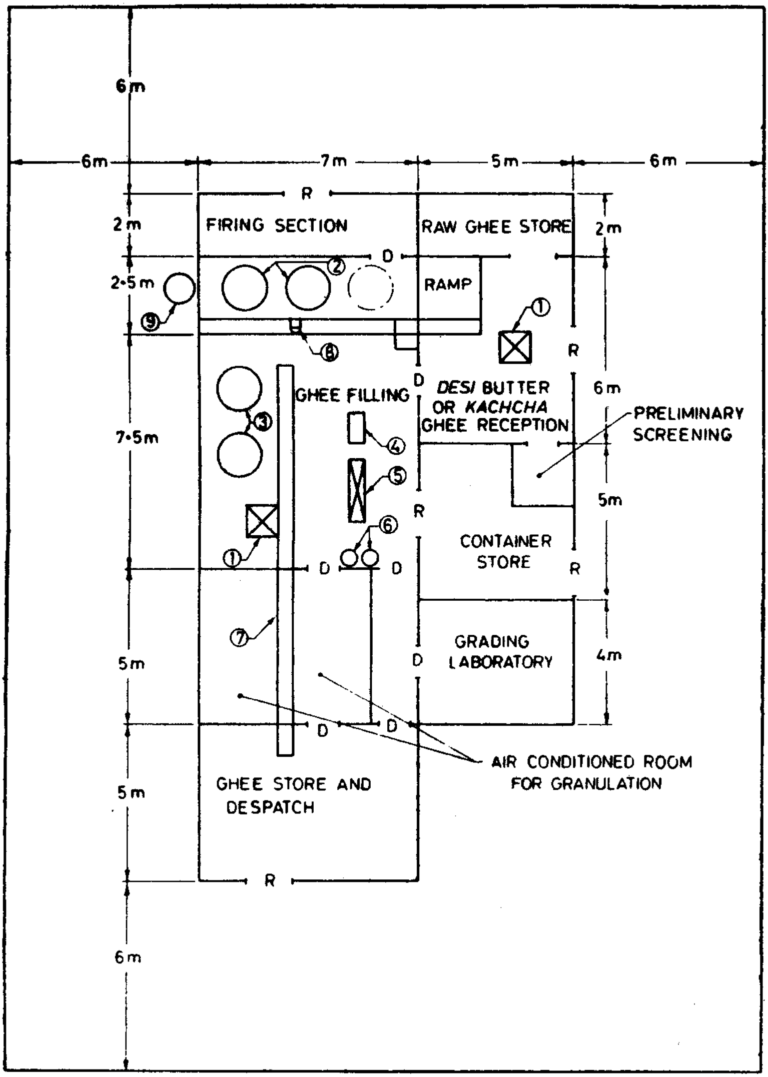
*Code for sanitary conditions for food processing units.

†Rules for rounding off numerical values (*revised*).



1. Platform, Weighing Machine
2. Melting Kettles
3. Settling Tank
4. Ghee Filling Machine into Small Tins
5. Stainless Steel Top Table for Keeping the Ghee Tin
6. Seaming Machine
7. Roller Conveyor
8. Centrifugal Pump
9. Chimney

FIG. 1 TYPICAL LAYOUT PLAN FOR A GHEE REFINERY

ghee refinery, due consideration shall be given to the limitations set out in **0.4** of this code. With a view to make this standard self-explanatory to the extent possible, the more important sanitary conditions are set out at appropriate places.

4. SITE

4.1 The refinery shall preferably be situated in an open, clean and healthful locality. No part of the refinery shall be used for residential purposes and it shall be free from sources of obnoxious fumes, smoke, odour or excessive dust. It is desirable to have:

a) space around it on all sides, subject to the existing municipal regulations of the place. A minimum space of 6 metres all around is recommended;

b) the inner ground clean and preferably paved or turfed to lay the dust; and

c) adequate dust-proof accessways for all vehicular traffic, connecting loading and unloading areas of the refinery to the public streets.

5. BUILDING

5.1 Structure — The building shall be of a permanent nature and shall be of brick and lime plaster, cement concrete or any other material which ensures cleanliness.

5.1.1 Construction of the building shall be such that it shall be rodent-proof and, as far as possible, insect-proof.

5.2 Ventilation and Lighting — The refinery shall be adequately lighted and ventilated keeping in mind the number of workers, their hours of work and nature of operation. Ventilation and lighting shall also be in accordance with the Factories Act, 1948, wherever applicable.

5.3 Floor — The floor shall be smooth, washable, properly sloped to gullies connected to sewers or drains. It shall be impervious to water and not affected by weak acids, alkalies or steam. Cement or stone floor shall be made for refinery, packing room and godowns.

5.4 Ceiling — The ceiling shall be capable of being cleaned properly. The roofing shall preferably be of reinforced cement concrete. For the reception dock and refining hall, asbestos cement sheets shall be used. Galvanized iron sheets and thatches shall be strictly avoided for roofing.

5.5 Internal Wall — The internal walls shall be smooth and faced to a height of at least 1·5 metres with impervious material capable of being washed. Walls shall be rounded off at corners to avoid accumulation of dust and dirt.

5.6 Repairs — The building shall be maintained in a proper state of repair and cleanliness. Whenever required, it may be lime washed, painted, disinfected, and deodorized.

6. RECEPTION DOCK

6.1 *KACHCHA* ghee, butter or cream brought to the refinery by the producers shall be received in a fairly spacious enclosure. The floor shall be non-absorbent and preferably be of cement or stone slabs capable of being scrubbed and washed. The enclosure shall be provided with roofing. The *KACHCHA* ghee, butter or cream tins shall not be exposed to sun, rain or dust.

6.2 Preliminary Screening

6.2.1 All the butter, *KACHCHA* ghee or cream received at the refinery should be subjected to preliminary screening before it is accepted or rejected. Preliminary screening generally consists of only three tests: Organoleptic examination; Butyro-refractometer reading at 40°C and Baudouin test. In doubtful cases, if these tests warrant, the samples are subjected to further tests, such as determination of Reichert value and Polenske values and free fatty acid content.

6.2.2 The refineries have, in a majority of the cases, attached grading laboratories situated in the same premises and in such cases preliminary screening is done in the grading laboratory. Refineries which are away from the grading laboratory shall be provided with necessary equipment for conducting preliminary screening. Only Organoleptic examination, Butyro-refractometer reading at 40°C and Baudouin test may be done here and the other tests, which require more elaborate equipment may be done in the laboratory. For details of laboratories *see* IS : 2981-1964*.

6.2.3 The following equipment and reagent shall be provided for preliminary screening:

a) A Butyro-refractometer with accessories for circulating water at 40°C through the instrument, and

b) Hydrochloric acid, furfural solution, glass or rubber stoppered test-tubes, test tubes stand, etc, required for performing Baudouin test.

6.3. Weighment of Butter, *KACHCHA* Ghee or Cream — Butter, *KACHCHA* ghee or cream received at the refinery is weighed before payment is made. A suitable weighing scale duly certified by the Weights and Measures Department shall be installed. The capacity of the scale shall be in accordance with the requirements of individual refinery. A platform scale shall be preferable.

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*Layout plan for dairy laboratories.

7. PROCESSING EQUIPMENT

7.1 The following equipment are generally required for processing butter or *KACHCHA* ghee or cream:

a) Ghee collecting vessels (*NANDS*);
b) Water-bath;
c) Heating pans (*KARAHIS*);
d) Stirrers and scoops;
e) Straining funnels;
f) Transfer channel — for transferring ghee from the heating pans to the settling tanks;
g) Settling tanks; and
h) Filling, sealing and/or seaming arrangement.

7.2 Materials

7.2.1 All the components and metallic parts which come into contact with butter, *KACHCHA* ghee or cream shall be of stainless steel conforming to designation to 07Cr19Ni9 of IS : 1570-1961* or aluminium conforming to grade SIC, NS3, NS4 or NS5 of IS : 737-1965†.

7.2.2 Copper and its alloys, cadmium, lead and zinc shall not come in contact with the ghee at any stage.

7.2.3 Non-metallic material, if used for sealing or lining, shall be non-toxic, non-absorbent and shall not impart any flavour, and be inert to ghee or buttermilk or any cleaning solution normally used.

7.3 Fabrication

7.3.1 All surfaces coming into contact with butter or *KACHCHA* ghee or cream shall be finished smooth, free from pits, crevices or other constructional features which might inhibit satisfactory sanitation.

7.3.2 All the parts shall be readily accessible or removable for cleaning and inspection.

7.3.3 All interior corners shall be rounded off to facilitate cleaning and drainage.

7.3.4 Hinges and latches shall be of the simple take-apart type.

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*Schedules for wrought steels for general engineering purposes.

†Specification for wrought aluminium and aluminium alloys, sheet and strips for general engineering purposes (*revised*).

7.4 Ghee Collecting Vessels (*NANDS*)—*NANDS* are cylindrical vessels with handles and lids, used exclusively for weighing ghee. They shall be of the following approximate dimensions:

Capacity	*Diameter*	*Height*
100 litres	50 cm	60 cm
200 litres	50 cm	120 cm

The brim shall be reinforced and ridged and provided with a spout for easy pouring of ghee. Where necessary, the bottom shall also be reinforced. The handles shall be welded to the outer surface and not riveted.

7.5 Water-Bath — Water-bath is used at several ghee refineries for melting the remnants of ghee adhering to the sides of the tins after emptying the *KACHCHA* ghee in the heating pans. It shall be a shallow vessel with a flat bottom or a tray made of mild steel or tin sheets depending upon the size of the water-bath.

7.6 Heating Pans

7.6.1 *KARAHIS* are used for heating butter, *KACHCHA* ghee or cream. They shall be constructed with hemispherical, dished or conical bottom. They may preferably have rigid welded handles. The joints in the pan shall be welded and finished smooth. The component parts shall not be riveted. They shall be of the following capacities:

500 litres
1 000 litres
2 000 litres

7.6.2 Where heating is by steam, the pan shall conform to IS : 2829-1964*.

7.6.3 Provision may be made in the heating pan for placing a thermometer to indicate or record the temperature of the ghee.

7.7 Stirrers and Scoops

7.7.1 During heating of butter, *KACHCHA* ghee or cream the contents in the heating pan are constantly stirred to facilitate escape of moisture and to prevent charring of casein. For this, rods, preferably of stainless steel or aluminium alloy with flattened ends on one side, shall be used. Some arrangements shall be made on the brim of the heating pan for resting of stirrers. For large size heating pans mechanical agitator may be used.

7.7.2 While heating butter, *KACHCHA* ghee or cream the scum that rises to the top is frequently scooped out. This is done with metallic scoops. The scoop shall be welded smooth to the rod and it shall not be temporarily fixed by a sleeve or any such device.

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*Specification for steam-jacketed ghee pans.

7.8 Strainer — Before ghee is transferred from the heating pan to the settling tank, it shall be strained through a detachable strainer having an aperture width of not more than 1·40-mm IS Sieve (*see* IS : 460-1962*). The strainer shall be preferably made of stainless steel. It shall not be permanently fixed to the channel and shall be capable of being removed for cleaning.

7.9 Transfer Device — Ghee shall preferably be transferred through a stainless steel pipe and a stainless steel pumping arrangement. Alternatively, the ghee may be transferred through a metallic channel.

7.10 Settling Tank

7.10.1 A settling tank shall be preferably of the cylindrical type with a conical or dished bottom with suitable arrangement for mounting.

7.10.2 The interior corners shall be rounded off facilitating cleaning and drainage.

7.10.3 The lid shall be in two or more parts and of the overlapping type with a suitable locking and sealing arrangement.

7.10.4 A central outlet at the bottom shall be provided for completely draining the tank. A side outlet at a suitable height preferably with a baffle inside the tank shall also be provided for drawing clear ghee from the tank.

7.10.5 The approximate capacities of the settling tanks shall be 500, 1 000, 2 000, 4 000 and 6 000 litres.

7.10.6 A centrifugal clarifier may also be used for clarification of ghee and the clarified ghee may be led to a tank similar to a settling tank from where it can be drawn for filling into containers. The pipe lines shall be of stainless steel.

7.11 Filling, Sealing and Seaming Arrangements — There shall be necessary arrangements for filling of ghee, sealing and seaming of the containers.

8. REFINERY

8.1 In the refinery butter, *KACHCHA* ghee or cream is heated and transferred to the settling tank.

8.2 The floor, walls and ceiling shall be maintained clean.

8.3 Adequate and efficient drainage shall be provided for the free flow of wash-water. The drains shall be cemented and covered with detachable covers. Particular care shall be taken to keep the drains clean and at

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*Specification for test sieves (*revised*).

suitable places traps shall be provided to avoid blocking or choking. Adequate facilities for washing the floor shall be provided.

8.4 The refinery shall be well ventilated and lighted.

8.5 There shall be adequate space for handling butter, *KACHCHA* ghee or cream tins in the refinery. The refinery shall not be used as a store room. As soon as the butter, *KACHCHA* ghee or cream is emptied into the heating pans, the empty tins may be removed from the refinery.

8.6 Care shall be taken to make the room insect-proof and also rodent-proof.

8.7 Furnace

8.7.1 The furnace on which the heating pans are mounted shall be made of fire brick and fire clay plaster, preferably one layer of insulation bricks may be provided. The height of the furnace shall be about one meter and steps shall be provided for climbing up the platform. There shall be adequate space all round the heating pan for workers to stand and carry out the necessary operations.

8.7.2 The furnace may be of the single-pan or multiple-pan type according to requirements.

8.7.3 In case of charcoal, and wood, firing arrangement shall be from the other side of the room. No wood or charcoal shall be brought into the room and the room shall be free from smoke, ash, fumes, etc.

8.7.4 A efficient chimney shall be provided for the exit of smoke and spent gases.

8.7.5 The heating pans shall be snugly placed on the furnace in such a way as not to allow smoke to enter the refinery.

9. PACKING ROOM

9.1 In the packing room, ghee is filled into tins, cooled for granulation, sealed and labelled.

9.2 The room shall be amply ventilated and lighted and shall be insect-proof and rodent-proof.

9.3 The floors shall be of cement or polished stone and shall be maintained clean.

9.4 While filling ghee from the settling tank into tins a shallow tray shall be placed under the outlet so that the drippings may be collected in the tray and not allowed to spread on the floor.

9.5 Tins filled with ghee shall not be allowed to remain with their bung holes uncovered. If they are to be kept for granulation without sealing them, the mouth shall be covered in such a way as to prevent entry of rodents, insects and other foreign matter by a suitable device like wooden frames fitted with the fine wire mesh or muslin cloth. Each frame can cover 40 to 50 tins.

9.6 Care shall be taken to ensure that the ghee is not contaminated with acid while soldering the bungs of the tins.

9.7 Sealed tins ready for despatch to the market shall be stored in a separate room.

10. EMPTY CONTAINERS

10.1 New empty containers shall be stored with their bungs down so that dust or any objectionable matter likely to contaminate ghee may not fall in them.

10.2 Used Containers — Adequate facilities for cleaning and storage shall be provided in the refineries for the used tin containers, if required.

11. GENERAL HYGIENE

11.1 Waste and rubbish shall be collected in covered receptacles and shall not be allowed to lie about on the floor.

11.2 When insecticides are used, great care shall be exercised to prevent contamination of equipment, ghee, and packing materials. Under no circumstances, shall insecticides be used during processing in the refinery or during packing operations in the packing room. No lavatory, sink, cesspool or garbage shall be so situated or maintained that odour or fumes therefrom pervade any part of the refinery.

11.3 Proper places shall be provided for storage of brooms, brushes, buckets and other clearing gear.

11.4 There shall be no cobwebs in any part of the refinery premises.

11.5 No other fat or petroleum product other than that used for lubricating the machinery or as fuel shall be found in the premises of the refinery.

11.6 There shall be an adequate supply of water. The water shall be pure and free from pathogenic micro-organisms.

11.7 Adequate facilities for the employees to wash their hands shall be provided.

12. EMPLOYEE HYGIENE

12.1 Every person employed in the refinery shall be medically examined, before employment and periodical medical examination of the employees shall be subsequently carried out to ensure that they are free from contagious or communicable diseases. A record of these examinations signed by a registered medical practitioner shall be maintained.

12.2 If at any time, the medical officer is of the opinion that any person is unfit for employment on the grounds that his continuation will involve danger of contamination of ghee or raw material or both, he shall not be allowed to work till he is declared fit.

12.3 All workers who handle ghee or raw material or both shall be medically examined after absence of sickness before being allowed to work.

12.4 No employee who is suffering from a hand or face injury, suppurating skin infection or clinically recognizable infectious disease shall be permitted to work in a refinery. A person who is wearing a bandage, plaster or other protective covering for a hand injury shall not be allowed to handle raw materials or the unprotected products.

12.5 Employees shall keep their finger nails short and clean and wash their hands before commencing work and after each absence. Inspection of arms, hands and nails of the employees handling ghee or raw material or both shall be carried out daily by the work supervisor and any person suffering from any illness shall be referred to the medical officer before being allowed to work.

12.6 It shall be made an obligation on all employees to notify to the medical officer case of diarrhoea, food poisoning, typhoid, dysentry or other notifiable diseases occurring in their own homes and families.

12.7 All employees shall be inoculated and vaccinated against the enteric group of diseases once a year and against smallpox once in two years. In case of an epidemic, all workers shall be inoculated. A record shall be kept.

12.8 Employees shall always wear clean overalls and shall in addition wear clean washable caps and masks where necessary. All protective clothing shall be maintained in good repair. Clothing shall not be stored in work rooms.

12.9 Spitting or the use of tobacco in any form or betel leaves shall be prohibited within the manufacturing area of the refinery. Notice to this effect shall be prominently displayed.

13. EMPLOYEE COMFORT FEATURES

13.1 All employees handling butter, *KACHCHA* ghee or cream shall be provided with working clothes in generous quantity. They shall preferably be white.

13.2 Employees shall be provided with rubber gloves depending upon the nature of work.

13.3 Sufficient and suitable sanitary conveniences shall be provided, maintained and kept clean in the refinery. The conveniences shall be properly lighted. Separate conveniences shall be provided for each sex. No convenience shall open directly into any work room in the refinery.

13.4 The number of latrines and wash-basins may be in accordance with Table III of IS : 1172-1963*.

13.5 Storage facilities shall be provided so that employees may deposit their clothes during working hours.

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*Code of basic requirements for water supply, drainage and sanitation (*revised*).

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